PATENT ABSTRACTS OF JAPAN

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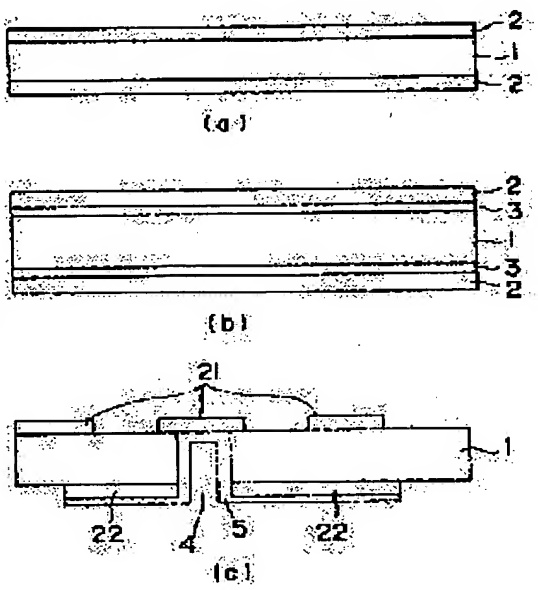
(54) MANUFACTURE OF FILM CARRIER

(57)Abstract:
PROBLEM TO BE SOLVED: To ensure conduction of through hole in a short machining time by performing laser beam machining by using an excimer laser after using a carbon dioxide laser.
SOLUTION: A film carrier is manufactured by respectively forming a wiring lead pattern 21 for signal and a wiring pattern 22 for power supply and grounding on metallic foil 2 which are vapor-deposited on both surfaces of a film 1 which becomes a substrate or stuck to both surfaces of the film 1 with an adhesive 3. Then a blind via hole 4 is formed into the film carrier in such a way that, after a laser beam is projected upon the carrier from a carbon dioxide laser for a sufficiently long time, the residue of the substrate left in the hole opened by the carbon dioxide laser beam is removed by additionally projecting an excimer laser beam upon the residue. Therefore, in-hole continuity can be ensured in a short machining time.



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CLAIMS

[Claim(s)]

[Claim 1] The manufacture approach of the tape carrier package characterized by removing the metal layer of the beer hall section of one field using the insulating film which has a metal layer to both sides, using an excimer laser in the manufacture approach of the tape carrier package which forms a beer hall by galvanizing hole processing in a deed and a hole on an insulating film by laser beam machining from the same field after using carbon dioxide laser for said laser beam machining, and carrying out.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention relates to the puncturing approach which forms especially the beer about the manufacture approach of the tape carrier package which has double-sided metal wiring which can carry a semiconductor device.

[0002]

[Description of the Prior Art] The printed wired board is widely used for industrial-use electronics equipments, such as consumer electronics, such as television, a cellular phone, a game machine, radio, an audio equipment, and VTR, a computer and OA equipment, an electronic application device, an electric measuring instrument, and a transmitter. In recent years, requests are mounting in the gestalt with these compacter devices. In order to fill this demand, it is designed so that it may correspond to the miniaturization of electronic equipment, densification, and high performance-ization, and minor-diameter-izing of thinning of wiring, minor-diameter-izing of a beer hall, a land, a pad, etc., flexible-izing of a base material, multilayering, and an finization are progressing quickly based on this.

[0003] Moreover, recently, a polyimide film, polyester film, etc. with sufficient flexibility are used, the base material used aims at high performance-ization, although an epoxy resin, phenol resin, and acrylic resin were used from the former, and the development using fluororesin, polyphenylene oxide, polysulfone, polyether imide, etc. is also progressing.

[0004] Generally the printed wired board mentioned above has the structure where the circuit-pattern-ized metallic foil exists and an insulating layer is prepared by a lamination or printing if needed on an insulating base film. It came to correspond by multilayering for the latest small-and-light-izing and an finization. In connection with this technique, a through hole, a slit, or a component hole is established in the part

which needs plating and solder, or the part equipped with components.

[0005] A through hole, a slit, a component hole, etc. are punctured by the chemical technique or the mechanical technique to an insulating base material. Puncturing of an insulating film has punching used, using a drill.

[0006] However, in addition to minor-diameter-izing of minor-diameter-izing of holes, such as thinning of a conductor pattern, a through hole, a slit, and a component hole, a land, a pad, etc., flexible-izing of a patchboard, and multilayering, there is also a case where a blind beer hall is prepared, to the request of the miniaturization of the latest electronic equipment, high-density-assembly-izing, and high-performance-izing instead of preparing a through hole for the same purpose.

[0007] Minor diameter blind beer hall formation is impossible by the conventional drill and the conventional punching processing approach of the processing method. processing with carbon-dioxide-gas (CO2) laser -- holes, such as a through hole, a slit, and a component hole, -- although it is suitable for processing, it is not suitable for processing of a minor diameter blind beer hall. the case where especially in minor diameter blind beer hall formation a double-sided metallic foil film has the fault to which a thin film remains at the hole lowest pars basilaris ossis occipitalis when only a CO2 laser is used for hole processing, and only an excimer laser is used for it -- a residual membrane -- there is nothing -- a hole -- although it was processible, floor to floor time was very long, and there was a fault whose mass-production nature does not improve.

[0008]

[Problem(s) to be Solved by the Invention] the thin film which the technical problem which this invention tends to solve irradiates carbon-dioxide-gas (CO2) laser at a base material film in processing which carries out blind beer hall formation in the location for which a double-sided metallic foil film asks, and remains at the **** pars basilaris ossis occipitalis at the time of carrying out puncturing processing -- perfect -- removing -- the short hole of floor to floor time -- it is offering the manufacture approach of the double-sided metallic foil tape carrier package which certainly enables an inside flow.

[0009]

[Means for Solving the Problem] This invention is what solves this technical problem. Invention of claim 1 The metal layer of the beer hall section of one field is removed using the insulating film which has a metal layer to both sides. In the manufacture approach of the tape carrier package which forms a beer hall by galvanizing hole processing in a deed and a hole on an insulating film by laser beam machining from the same field After using carbon dioxide laser for said laser processing, it considers as the

manufacture approach of the tape carrier package characterized by carrying out by using an excimer laser.

[0010]

[Embodiment of the Invention] Next, the gestalt of implementation of the manufacture approach of the tape carrier package which performed punching processing by this invention is explained in detail with reference to a drawing.

[0011] Drawing 1 is the explanatory view which expressed the example of the tape carrier package concerning this invention in the cross section, and the cross-section explanatory view in which (a) prepared the metal layer in both sides of a base material film, the cross-section explanatory view in which (b) prepared the metal layer in both sides of a base material film through the adhesives layer, and (c) are the explanatory views which expressed the example of the tape carrier package manufactured by this invention in the cross section. The sectional view of a double-sided metallic foil tape carrier package in which a flow is prepared through a beer hall is shown in drawing 1 (c). the thing which formed metallic foils 2 (for example, copper, aluminum, etc.) in both sides of the film 1 (for example, heat-resistant film by which polyimide film representation is carried out) with which this double-sided metallic foil tape carrier package serves as a base material by the vacuum-evaporationo approach, the printing approach, etc. like drawing 1 (a), or drawing (b) -- like -- adhesives 3 -- on remaining one side, a power source and the circuit pattern 22 for glands are formed in ********** for the wiring lead pattern 21 for signals about a double-sided metallic foil at one side.

[0012] Although the beer hall 4 established in the above-mentioned film is punctured from the power-source and circuit pattern side for glands, punching is carried out to to the metallic foil of the wiring lead for signals, and the configuration of a through hole is not taken. The configuration connected by carrying out the wall of a blind beer hall for the wiring lead pattern for signals, and a power source and the circuit pattern for glands metal plating 5 is taken.

[0013] As the approach of punching of this blind beer hall, if CO2 laser light is irradiated, a hole can be formed in a short time, but if it becomes a minor diameter below the diameter of 150 micrometer, in direct microscope observation, the about several micrometers base material thin film which cannot be checked remains. Removal is difficult even if the thickness of a residual membrane does not decrease even if it adjusts the output and the count of an exposure pulse of laser, but it processes wet DESUMIYA.

[0014] If this residual membrane exists, connection cannot do the wiring lead pattern for signals, and the power source and the circuit pattern for glands by metal plating,

and the purpose of a flow cannot be attained. The sectional view of a tape carrier package which became a defect at drawing 2 is shown.

[0015] A double-sided metallic foil tape carrier package consists of the film 1 and metallic foil 2 which are a base material, and adhesives intervene if needed. Although the component of the thin film which remains changed with configurations of a tape, when spatter vacuum evaporationo, direct plaiting, etc. were pretreated to such a residual membrane and the plating process was performed, it can galvanize by the thickness for which it asks, and a flow came to be completed seemingly. However, when it actually inspects electrically, it is in an insulating condition.

[0016] In order to produce the blind beer hall of the minor diameter below the diameter of 150 micrometer in the location for which it asks as an example of a gestalt of implementation of the manufacture approach of the tape carrier package of this invention, after fully irradiating CO2 laser light, the residual membrane of a base material is removed by carrying out the additional exposure of the excimer laser light to the hole which carried out hole processing with this CO2 laser light.

[0017] CO2 laser light and excimer laser light -- irradiating -- a hole -- spatter vacuum evaporationo, nonelectrolytic plating, or direct plaiting is given to the processed hole, electrolysis metal plating is performed, and it considers as desired metal plating thickness.

[0018] By performing the above-mentioned laser punching process, a flow can obtain the double-sided metallic foil tape carrier package in which the good blind beer hall was formed. Moreover, floor to floor time can be shortened compared with the case where only excimer laser light is used.

[0019]

[Example] The example of this invention is explained concretely below.

A polyimide tape with a thickness of 50 micrometers is printed by the 1st page of copper foil with a <example 1> thickness of 18 micrometers. Form the adhesives layer of 12-micrometer thickness in the polyimide side, and the roll lamination of the copper foil with a thickness of 18 micrometers is further carried out on it. The positive type photoresist was applied to the copper foil side without an adhesives layer, the location which asks for a beer hall with a diameter of 110 micrometers was exposed, patterning was developed negatives and carried out, and in order to protect so that the copper foil of another side may not be etched, after performing flesh-side stop processing, etching and resist exfoliation were performed.

[0020] The CO2 laser which adjusted the beam so that 100 micrometers of diameters of beer for which it asks in the location for which it asks might be formed was irradiated 4

times with the energy of 3.0mj(s). Furthermore, the excimer laser which adjusted the beam so that it might become 100 micrometers of diameters of beer was irradiated once.

[0021] DESUMIA processing of the polyimide tape which ended laser beam machining was carried out by potassium permanganate, after spatter processing, electrolytic copper plating was performed and copper plating with a plating thickness of 10 micrometers was given in beer.

[0022] When the tomographic layer of the formed beer which galvanized was observed under the microscope, the copper foil of a beer pars basilaris ossis occipitalis and the galvanized part touched certainly. Moreover, although one of beer was cut off and the resistance in both sides was measured, the resistance between both sides did not exist but was able to form the good flow.

[0023] A polyimide tape with a thickness of 50 micrometers is printed by the 1st page of copper foil with a <example 2> thickness of 18 micrometers. Form the adhesives layer of 12-micrometer thickness in the polyimide side, and the roll lamination of the copper foil with a thickness of 18 micrometers is further carried out on it. The positive type photoresist was applied to the copper foil side without an adhesives layer, the location which asks for a beer hall with a diameter of 60 micrometers was exposed, patterning was developed negatives and carried out, and in order to protect so that the copper foil of another side may not be etched, after performing flesh-side stop processing, etching and resist exfoliation were performed.

[0024] The copper foil designed and etched was used as the mask so that 50 micrometers of diameters of beer for which it asks in the location for which it asks might be formed, and the CO2 laser was irradiated 4 times with the energy of 3.0mj(s). Furthermore, the excimer laser which adjusted the beam so that it might become 50 micrometers of diameters of beer was irradiated once.

[0025] DESUMIA processing of the polyimide tape which ended laser beam machining was carried out by potassium permanganate, after spatter processing, electrolytic copper plating was performed and copper plating with a plating thickness of 5 micrometers was given in beer.

[0026] When the tomographic layer of the formed beer which galvanized was observed under the microscope, the copper foil of a beer pars basilaris ossis occipitalis and the galvanized part touched certainly. Moreover, although one of beer was cut off and the resistance in both sides was measured, the resistance between both sides did not exist but was able to form the good flow.

[0027] A polyimide tape with a thickness of 50 micrometers is printed by the 1st page of copper foil with a <example 3> thickness of 18 micrometers. Form the adhesives layer of

12-micrometer thickness in the polyimide side, and the roll lamination of the copper foil with a thickness of 18 micrometers is further carried out on it. The positive type photoresist was applied to the copper foil side without an adhesives layer, the location which asks for a beer hall with a diameter of 160 micrometers was exposed, patterning was developed negatives and carried out, and in order to protect so that the copper foil of another side may not be etched, after performing flesh-side stop processing, etching and resist exfoliation were performed.

[0028] The copper foil designed and etched was used as the mask so that 150 micrometers of diameters of beer for which it asks in the location for which it asks might be formed, and the CO2 laser was irradiated 4 times with the energy of 3.0mj(s). Furthermore, the excimer laser which adjusted the beam so that it might become 150 micrometers of diameters of beer was irradiated once.

[0029] DESUMIA processing of the polyimide tape which ended laser beam machining was carried out by potassium permanganate, after spatter processing, electrolytic copper plating was performed and copper plating with a plating thickness of 10 micrometers was given in beer.

[0030] When the tomographic layer of the formed beer which galvanized was observed under the microscope, the copper foil of a beer pars basilaris ossis occipitalis and the galvanized part touched certainly. Moreover, although one of beer was cut off and the resistance in both sides was measured, the resistance between both sides did not exist but was able to form the good flow.

[0031] A polyimide tape with a thickness of 50 micrometers is printed by the 1st page of copper foil with a <example 1 of comparison> thickness of 18 micrometers. Form the adhesives layer of 12-micrometer thickness in the polyimide side, and the roll lamination of the copper foil with a thickness of 18 micrometers is further carried out on it. The positive type photoresist was applied to the copper foil side without an adhesives layer, the location which asks for a beer hall with a diameter of 160 micrometers was exposed, patterning was developed negatives and carried out, and in order to protect so that the copper foil of another side may not be etched, after performing flesh-side stop processing, etching and resist exfoliation were performed.

[0032] The copper foil designed and etched was used as the mask so that 150 micrometers of diameters of beer for which it asks in the location for which it asks might be formed, and the CO2 laser was irradiated 6 times with the energy of 3.0mj(s).

[0033] DESUMIA processing of the polyimide tape which ended laser beam machining was carried out by potassium permanganate, after spatter processing, electrolytic copper plating was performed and copper plating with a plating thickness of 10

micrometers was given in beer.

[0034] When the tomographic layer of the formed beer which galvanized was observed under the microscope, the insulating layer was formed between the copper foil of a beer pars basilaris ossis occipitalis, and the galvanized part. Moreover, although one of beer was cut off and the resistance in both sides was measured, the resistance between both sides existed and it was shown that the galvanized part and a beer pars basilaris ossis occipitalis are non-contact.

[0035] Moreover, when the copper foil of the periphery containing beer was removed and the pars basilaris ossis occipitalis of beer was observed under the microscope, about 2-micrometer film was observed.

[0036] A polyimide tape with a thickness of 50 micrometers is printed by the 1st page of copper foil with a <example 2 of comparison> thickness of 18 micrometers. Form the adhesives layer of 12-micrometer thickness in the polyimide side, and the roll lamination of the copper foil with a thickness of 18 micrometers is further carried out on it. The positive type photoresist was applied to the copper foil side without an adhesives layer, the location which asks for a beer hall with a diameter of 160 micrometers was exposed, patterning was developed negatives and carried out, and in order to protect so that the copper foil of another side may not be etched, after performing flesh-side stop processing, etching and resist exfoliation were performed.

[0037] The copper foil designed and etched was used as the mask so that 150 micrometers of diameters of beer for which it asks in the location for which it asks might be formed, and the CO2 laser was irradiated 12 times with the energy of 3.0mj(s).

[0038] DESUMIA processing of the polyimide tape which ended laser beam machining was carried out by potassium permanganate, after spatter processing, electrolytic copper plating was performed and copper plating with a plating thickness of 10 micrometers was given in beer.

[0039] When the tomographic layer of the formed beer which galvanized was observed under the microscope, the insulating layer was formed between the copper foil of a beer pars basilaris ossis occipitalis, and the galvanized part. Moreover, although one of beer was cut off and the resistance in both sides was measured, the resistance between both sides existed and it was shown that the galvanized part and a beer pars basilaris ossis occipitalis are non-contact.

[0040] Moreover, when the copper foil of the periphery containing beer was removed and the pars basilaris ossis occipitalis of beer was observed under the microscope, about 2-micrometer film was observed.

[0041]

[Effect of the Invention] In case this invention irradiates laser and processes a blind beer hall into the tape base material with which a metallic foil exists in both sides by using together and processing a CO2 laser and an excimer laser, it can form in a beer pars basilaris ossis occipitalis the beer with which the thin film of a base material does not remain, and can consider it as the manufacture approach of the tape carrier package which offers the tape which can take a positive flow among both sides of the short tape of floor to floor time.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the explanatory view which expressed the example of the tape carrier package concerning this invention in the cross section, and the cross-section explanatory view in which (a) prepared the metal layer in both sides of a base material film, the cross-section explanatory view in which (b) prepared the metal layer in both sides of a base material film through the adhesives layer, and (c) are the explanatory views which expressed the example of the tape carrier package manufactured by this invention in the cross section.

[Drawing 2] It is the explanatory view which expressed the tape carrier package of a defective in the cross section.

[Description of Notations]

1 ... Base material film

2 ... Metallic foil

3 ... Adhesives

4 ... Beer hall

5 ... Metal plating

21 ... Wiring lead pattern for signals

22 ... A power source and circuit pattern for glands

[Translation done.]

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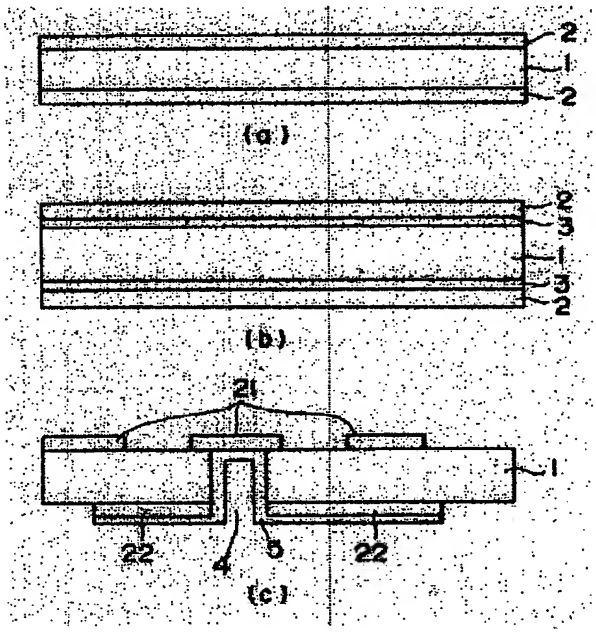
(54)【発明の名称】　フィルムキャリアの製造方法

(57)【要約】
【課題】両面に金属層を有する絶縁性フィルムを用い、一方の面のビアホール部の金属層を除去し、同じ面からレーザー加工によって絶縁性フィルムに孔加工を行い、孔内にめっきすることによってビアホールを形成するフィルムキャリアの製造方法において、基材フィルムに炭酸ガス（CO_2）レーザーを照射して開孔加工した際の孔最底部に残存する薄膜を完全に除去し、加工時間の短い孔内導通を確実に可能とする両面金属箔フィルムキャリアの製造方法を提供することである。
【解決手段】前記レーザー加工を、炭酸ガスレーザーを用いた後に、エキシマレーザーを用いて行うことを特徴とする。



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【特許請求の範囲】

【請求項１】両面に金属層を有する絶縁性フィルムを用い、一方の面のビアホール部の金属層を除去し、同じ面からレーザー加工によって絶縁性フィルムに孔加工を行い、孔内にめっきすることによってビアホールを形成するフィルムキャリアの製造方法において、前記レーザー加工を、炭酸ガスレーザーを用いた後に、エキシマレーザーを用いて行うことを特徴とするフィルムキャリアの製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は半導体素子を搭載できる両面金属配線を有するフィルムキャリアの製造方法に関し、とくにそのビアを形成する開孔方法に関する。

【０００２】

【従来の技術】プリント配線板は、テレビ、携帯電話、ゲーム機、ラジオ、音響機器、ＶＴＲ等の民生用電子機器や、電子計算機、ＯＡ機器、電子応用機器、電気計測器、通信機等の産業用電子機器に広く使用されている。近年、これら機器はよりコンパクトな形態へと要望が高まっている。この要求を充たすため、電子機器の小型化、高密度化、高性能化に対応するように設計され、これに基づいて、配線の細線化、ビアホールの小径化、ランド、パッド等の小径化、基材のフレキシブル化、多層化、及びファイン化が急速に進んでいる。

【０００３】また、使用される基材は、エポキシ樹脂、フェノール樹脂、アクリル樹脂が従来から使用されていたが、最近では、柔軟性が良いポリイミドフィルムやポリエステルフィルム等が使用され、高性能化を狙ってフッ素系樹脂、ポリフェニレンオキシド、ポリスルホン、及びポリエーテルイミド等を用いた開発も進んでいる。

【０００４】上述したプリント配線板は、一般的には、絶縁性ベースフィルム上に配線パターン化された金属箔が存在し、必要に応じてラミネート或いは印刷によって絶縁層が設けられる構造となっている。最近の軽薄短小化、及び、ファイン化のため、多層化で対応するようになった。この技術に伴い、めっきや半田を必要とする箇所や部品を装着する箇所にスルーホール、スリット或いは部品孔が設けられる。

【０００５】スルーホール、スリットや部品孔等は、絶縁性基材に化学的手法か機械的手法にて開孔する。絶縁フィルムの開孔はドリルを用いるか、或いは、パンチングを用いられる。

【０００６】しかしながら、最近の電子機器の小型化、高密度実装化、高性能化の要請に対し、導体パターンの細線化、スルーホール、スリット、部品孔等の孔の小径化、ランド、パッド等の小径化及び配線板のフレキシブル化及び多層化に加え、同様な目的でスルーホールを設ける代わりにブラインドビアホールを設けるケースもある。

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【０００７】小径ブラインドビアホール形成は、従来の加工法のドリルやパンチング加工方法では不可能である。炭酸ガス（CO_2）レーザでの加工もスルーホール、スリット、部品孔等の孔加工には適するが、小径ブラインドビアホールの加工には適さない。特に両面金属箔フィルムに小径ブラインドビアホール形成の場合は、孔加工にCO_2レーザーのみを使用すると薄膜が孔最下底部に残存する欠点があり、また、エキシマレーザーのみを使用した場合は残膜なく孔加工できるが、加工時間が非常に長く、量産性が向上しない欠点があった。

【０００８】

【発明が解決しようとする課題】本発明が解決しようとする課題は、両面金属箔フィルムの所望する位置に、ブラインドビアホール形成する加工において、基材フィルムに炭酸ガス（CO_2）レーザーを照射して開孔加工した際の孔最底部に残存する薄膜を完全に除去し、加工時間の短い孔内導通を確実に可能とする両面金属箔フィルムキャリアの製造方法を提供することである。

【０００９】

【課題を解決するための手段】本発明はかかる課題を解決するものであり請求項１の発明は、両面に金属層を有する絶縁性フィルムを用い、一方の面のビアホール部の金属層を除去し、同じ面からレーザー加工によって絶縁性フィルムに孔加工を行い、孔内にめっきすることによってビアホールを形成するフィルムキャリアの製造方法において、前記レーザー加工を、炭酸ガスレーザーを用いた後に、エキシマレーザーを用いて行うことを特徴とするフィルムキャリアの製造方法としたものである。

【００１０】

【発明の実施の形態】次に、本発明による穿孔処理を施したフィルムキャリアの製造方法の実施の形態について、図面を参照して、詳しく説明する。

【００１１】図１は本発明にかかるフィルムキャリアの実施例を断面で表した説明図で、（ａ）は基材フィルムの両面に金属層を設けた断面説明図、（ｂ）は基材フィルムの両面に接着剤層を介し金属層を設けた断面説明図、（ｃ）は本発明により製造したフィルムキャリアの実施例を断面で表した説明図である。図１（ｃ）にはビアホールを介して導通が設けられる両面金属箔フィルムキャリアの断面図を示している。この両面金属箔フィルムキャリアは、基材となるフィルム１（例えば、ポリイミドフィルム代表される耐熱性フィルム）の両面に金属箔２（例えば、銅、アルミニウムなど）を図１（ａ）のように蒸着方法や印刷方法などで設けたもの、あるいは図（ｂ）のように接着剤３で貼合わせたものに、両面の金属箔について片面に信号用配線リードパターン２１を、残りの片面には電源・グランド用配線パターン２２を形成したものである。

【００１２】上記フィルムに設けられるビアホール４は電源・グランド用配線パターン側から開孔されるが、穿

孔は信号用配線リードの金属箔までとし、スルーホールの形状は取らない。信号用配線リードパターンと電源・グランド用配線パターンをブラインドビアホールの内壁を金属めっき５して接続される形状を取る。

【００１３】このブラインドビアホールの穿孔の方法として、CO_2レーザー光を照射すると短時間に孔を形成できるが、１５０μm径以下の小径になると、直接の顕微鏡観察では確認できない数μm程度の基材薄膜が残存する。レーザーの出力や照射パルス回数を調整しても残膜の厚さは減少せず、ウェットデスミヤの処理を行っても、除去が困難である。

【００１４】この残膜が存在すると、金属めっきによる信号用配線リードパターンと電源・グランド用配線パターンを接続ができず、導通の目的が達成できない。図２に不良となったフィルムキャリアの断面図を示している。

【００１５】両面金属箔フィルムキャリアは基材であるフィルム１と金属箔２からなり、必要に応じて接着剤が介在する。残存する薄膜の成分はテープの構成によって異なるが、このような残膜にスパッタ蒸着やダイレクトプレーティングなどの前処理を施してめっき工程を行うと、所望する膜厚でめっきが可能であり、見かけ上は導通が完成したようになる。しかし、実際に電気的に検査すると、絶縁状態にある。

【００１６】本発明のフィルムキャリアの製造方法の実施の形態例として、所望する位置に１５０μm径以下の小径のブラインドビアホールを作製するため、CO_2レーザー光を十分に照射した後、このCO_2レーザー光で孔加工した孔に、エキシマレーザー光を追加照射することにより基材の残膜を取り除く。

【００１７】CO_2レーザー光とエキシマレーザー光を照射して孔加工した孔に、スパッタ蒸着、無電解めっき、或いは、ダイレクトプレーティングを施し、電解金属めっきを行って所望の金属めっき厚とする。

【００１８】上記レーザー穿孔工程を行うことで、導通が良好なブラインドビアホールを形成した両面金属箔フィルムキャリアを得ることができる。また、エキシマレーザー光のみ使用する場合に比べ加工時間を短くできる。

【００１９】

【実施例】以下に本発明の実施例を具体的に説明する。

＜実施例１＞厚さ１８μmの銅箔の１面に厚さ５０μmのポリイミドテープが印刷され、そのポリイミド面に１２μm厚の接着剤層を形成し、更にその上に厚さ１８μmの銅箔をロールラミネートし、接着剤層のない銅箔側にポジ型フォトレジストを塗布し、直径１１０μmのビアホールを所望する位置を露光、現像を行ってパターニングし、他方の銅箔がエッチングされないよう保護するために裏止め処理を施した後に、エッチングとレジスト剥離を行った。

【００２０】所望する位置に所望するビア径１００μmを形成するようにビームを調整したCO_2レーザーを３．０ｍｊのエネルギーで４回照射した。更に、ビア径１００μmになるようにビームを調整したエキシマレーザーを１回照射した。

【００２１】レーザー加工を終了したポリイミドテープを過マンガン酸カリウムでデスミア処理し、スパッタ処理後、電解銅めっきを行ってビア内にめっき厚１０μmの銅めっきを施した。

【００２２】めっきを施した形成したビアの断層面を顕微鏡で観察したところ、ビア底部の銅箔とめっきした部分とは確実に接触していた。また、ビアの１個を切り取り、両面での抵抗値を測定したが、両面間での抵抗値は存在せず、良好な導通が形成できていた。

【００２３】＜実施例２＞厚さ１８μmの銅箔の１面に厚さ５０μmのポリイミドテープが印刷され、そのポリイミド面に１２μm厚の接着剤層を形成し、更にその上に厚さ１８μmの銅箔をロールラミネートし、接着剤層のない銅箔側にポジ型フォトレジストを塗布し、直径６０μmのビアホールを所望する位置を露光、現像を行ってパターニングし、他方の銅箔がエッチングされないよう保護するために裏止め処理を施した後に、エッチングとレジスト剥離を行った。

【００２４】所望する位置に所望するビア径５０μmを形成するように設計、エッチングした銅箔をマスクにして、CO_2レーザーを３．０ｍｊのエネルギーで４回照射した。更に、ビア径５０μmになるようにビームを調整したエキシマレーザーを１回照射した。

【００２５】レーザー加工を終了したポリイミドテープを過マンガン酸カリウムでデスミア処理し、スパッタ処理後、電解銅めっきを行ってビア内にめっき厚５μmの銅めっきを施した。

【００２６】めっきを施した形成したビアの断層面を顕微鏡で観察したところ、ビア底部の銅箔とめっきした部分とは確実に接触していた。また、ビアの１個を切り取り、両面での抵抗値を測定したが、両面間での抵抗値は存在せず、良好な導通が形成できていた。

【００２７】＜実施例３＞厚さ１８μmの銅箔の１面に厚さ５０μmのポリイミドテープが印刷され、そのポリイミド面に１２μm厚の接着剤層を形成し、更にその上に厚さ１８μmの銅箔をロールラミネートし、接着剤層のない銅箔側にポジ型フォトレジストを塗布し、直径１６０μmのビアホールを所望する位置を露光、現像を行ってパターニングし、他方の銅箔がエッチングされないよう保護するために裏止め処理を施した後に、エッチングとレジスト剥離を行った。

【００２８】所望する位置に所望するビア径１５０μmを形成するように設計、エッチングした銅箔をマスクにして、CO_2レーザーを３．０ｍｊのエネルギーで４回照射した。更に、ビア径１５０μmになるようにビーム

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を調整したエキシマレーザーを１回照射した。

【００２９】レーザー加工を終了したポリイミドテープを過マンガン酸カリウムでデスミア処理し、スパッタ処理後、電解銅めっきを行ってビア内にめっき厚１０μｍの銅めっきを施した。

【００３０】めっきを施した形成したビアの断層面を顕微鏡で観察したところ、ビア底部の銅箔とめっきした部分とは確実に接触していた。また、ビアの１個を切り取り、両面での抵抗値を測定したが、両面間での抵抗値は存在せず、良好な導通が形成できていた。

【００３１】＜比較例１＞厚さ１８μｍの銅箔の１面に厚さ５０μｍのポリイミドテープが印刷され、そのポリイミド面に１２μｍ厚の接着剤層を形成し、更にその上に厚さ１８μｍの銅箔をロールラミネートし、接着剤層のない銅箔側にポジ型フォトレジストを塗布し、直径１６０μｍのビアホールを所望する位置を露光、現像を行ってパターニングし、他方の銅箔がエッチングされないよう保護するために裏止め処理を施した後に、エッチングとレジスト剥離を行った。

【００３２】所望する位置に所望するビア径１５０μｍを形成するように設計、エッチングした銅箔をマスクにして、CO_2レーザーを３．０ｍｊのエネルギーで６回照射した。

【００３３】レーザー加工を終了したポリイミドテープを過マンガン酸カリウムでデスミア処理し、スパッタ処理後、電解銅めっきを行ってビア内にめっき厚１０μｍの銅めっきを施した。

【００３４】めっきを施した形成したビアの断層面を顕微鏡で観察したところ、ビア底部の銅箔とめっきした部分の間には絶縁層が形成されていた。また、ビアの１個を切り取り、両面での抵抗値を測定したが、両面間での抵抗値は存在し、めっきした部分とビア底部が非接触であることを示した。

【００３５】また、ビアを含む周辺部の銅箔を取り除いて、ビアの底部を顕微鏡で観察すると、約２μｍの膜が観察された。

【００３６】＜比較例２＞厚さ１８μｍの銅箔の１面に厚さ５０μｍのポリイミドテープが印刷され、そのポリイミド面に１２μｍ厚の接着剤層を形成し、更にその上に厚さ１８μｍの銅箔をロールラミネートし、接着剤層のない銅箔側にポジ型フォトレジストを塗布し、直径１６０μｍのビアホールを所望する位置を露光、現像を行ってパターニングし、他方の銅箔がエッチングされないよう保護するために裏止め処理を施した後に、エッチングとレジスト剥離を行った。

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【００３７】所望する位置に所望するビア径１５０μｍを形成するように設計、エッチングした銅箔をマスクにして、CO_2レーザーを３．０ｍｊのエネルギーで１２回照射した。

【００３８】レーザー加工を終了したポリイミドテープを過マンガン酸カリウムでデスミア処理し、スパッタ処理後、電解銅めっきを行ってビア内にめっき厚１０μｍの銅めっきを施した。

【００３９】めっきを施した形成したビアの断層面を顕微鏡で観察したところ、ビア底部の銅箔とめっきした部分の間には絶縁層が形成されていた。また、ビアの１個を切り取り、両面での抵抗値を測定したが、両面間での抵抗値は存在し、めっきした部分とビア底部が非接触であることを示した。

【００４０】また、ビアを含む周辺部の銅箔を取り除いて、ビアの底部を顕微鏡で観察すると、約２μｍの膜が観察された。

【００４１】

【発明の効果】本発明は、CO_2レーザーとエキシマレーザーを併用して加工することで、両面に金属箔が存在するテープ基材にレーザーを照射して、ブラインドビアホールを加工する際、ビア底部に基材の薄膜の残存しないビアが形成でき、加工時間の短いテープの両面間で確実な導通が取れるテープを提供するフィルムキャリアの製造方法とすることができる。

【図面の簡単な説明】

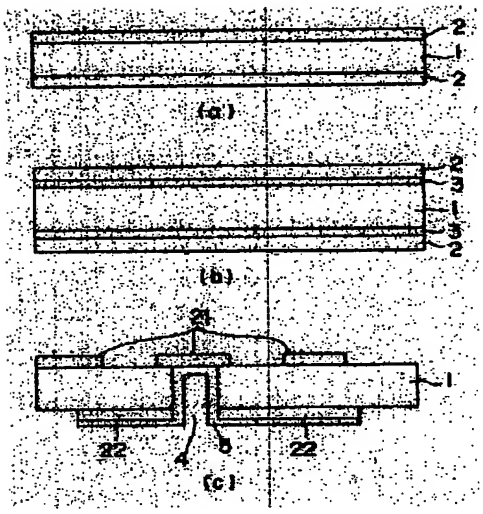
【図１】本発明にかかるフィルムキャリアの実施例を断面で表した説明図で、（ａ）は基材フィルムの両面に金属層を設けた断面説明図、（ｂ）は基材フィルムの両面に接着剤層を介し金属層を設けた断面説明図、（ｃ）は本発明により製造したフィルムキャリアの実施例を断面で表した説明図である。

【図２】不良品のフィルムキャリアを断面で表した説明図である。

【符号の説明】

１・・・基材フィルム
２・・・金属箔
３・・・接着剤
４・・・ビアホール
５・・・金属メッキ
２１・・・信号用配線リードパターン
２２・・・電源・グランド用配線パターン

【図１】



【図２】